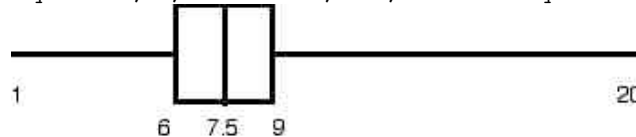


Practice Quiz 4 over 9.3 and Ch. 11

Instructions: Answer each question, and when required explain your answer. Your explanation must be clear and complete. You may refer to your book, your notes and your homework papers.

1. Consider the data 1, 5, 6, 6, 7, 8, 8, 9, 11, 20.

- (a) Find the mean of this data: $(1+5+6+6+7+8+8+9+11+20)/10 = 8.1$
- (b) Find the median of this data: take the middle data value if there is one, else average the two middle values, which in this case are 7 and 8 so the median is $(7+8)/2 = 7.5$.
- (c) Find the mode(s) of this data: 6 and 8, since they occur the most often.
- (d) Find the range of this data: $20-1=19$
- (e) Create and label a box and whisker plot of this data: the five number summary is the minimum, 1, the first quartile, 6, the median, 7.5, the third quartile, 9, and the maximum, 20.



- (f) Find the sample standard deviation of this data: the variance is $[(1-8.1)^2 + (5-8.1)^2 + (6-8.1)^2 + (6-8.1)^2 + (7-8.1)^2 + (8-8.1)^2 + (8-8.1)^2 + (9-8.1)^2 + (11-8.1)^2 + (20-8.1)^2] / (10-1) = 24.544$, so the sample standard deviation is the square root of this, or about 4.95.

2. Problem 13 on p. 712.

See the back of the book for the solution. The basic idea is that the skinnier the graph the smaller the standard deviation.

3. Suppose ACT scores in a particular year are approximately normally distributed with mean 20 and standard deviation of 6.

- (a) What z value does 29 represent?

Answer: An ACT score of 29 is 9 points above the mean. Since σ is 6, this is 1.5σ . Since z is just the number times σ that the score is above or below the mean, and since 29 is 1.5σ above the mean, we see $z = 1.5$. Note: when the score is below the mean, z is negative. So an ACT of 17 gives $z = -0.5$.

- (b) Use the table on page 709 to determine the proportion of test-takers that receive a 29 or better on the ACT test.

Answer: The proportion of test takers between the mean of 20 and 1.5σ above the mean is 43.32% according to the table. Since 50% are above the mean, there are $50 - 43.32 = 6.68\%$ above 1.5σ . In other words, 6.68% receive scores of 29 or better.

- (c) What ACT score must you get if 69.15% of test-takers received a higher score?

Answer: Note that to have 69.15% of test takers receive better scores than you, you're in the bottom half, so you must have gotten a score below the mean. Thus the percentage of test takers that got scores between your score and the mean of 20 is $69.15 - 50 = 19.15\%$. The table value for 0.1915 is $z = 0.5$; i.e., $(1/2)\sigma$ below the mean, or $20 - (1/2)6 = 20 - 3 = 17$. So you must have gotten a score of 17.

4. An American Research Group poll of a nationwide random sample of 2,104 likely voters was conducted by telephone March 2-5, 2007. It showed Clinton 42% and McCain 45% (with 10% Undecided). Determine a 95% confidence interval for the 45% McCain figure. Show how you compute your answer.

Answer: Since $n = 2104$, and $\hat{p} = 0.45$, we get $\hat{s} =$ interval is just the interval ranging from $2\hat{s}$ below \hat{p} to $2\hat{s}$ above \hat{p} . I.e., the confidence interval is $0.45 \pm .0216$ or 42.84% to 47.16%.

5. Problem 27 on p. 741.

Answer: Assuming a 95% confidence interval, the margin of error of 4% means that the standard error is half that, or 2%, so $\hat{s} = 0.02$. But using the formula $\hat{s} = (\hat{p}(1-\hat{p})/n)^{(1/2)}$ and given that $\hat{p} = 39\%$, we get $0.02^2 = (0.39 \cdot 0.61/n)$ so $n = 0.39 \cdot 0.61 / 0.02^2 = 594.75$ which rounds to 595.